CLAIMS

1. A method of analysing a mineral in granular form to provide information pertaining to its composition, the method comprising moving said granular mineral through an illumination zone, directing a beam of light at said mineral to illuminate it, collecting light reflected from said granular mineral and spectrally analysing the reflected light to obtain information pertaining to the composition of the granular mineral, said mineral being in the form of a layer having an undersurface and a top surface, said illumination zone being intermediate the undersurface and the top surface of the layer.

2. A method as claimed in claim 1 and including the step of inserting a probe into said layer so that a leading end of the probe is intermediate said undersurface and said top surface, illuminating the material in the vicinity of said leading end of said probe, and collecting light from the illuminated granular mineral in the vicinity of said leading end.

3. A method as claimed in claim 2, wherein said probe is inserted into said granular mineral from above.

4. A method as claimed in claim 1, 2 or 3 and including the step of scraping said layer so as to cause an upper part of the layer to be diverted so that it passes around said illumination zone thereby exposing, as an upwardly facing surface intermediate said undersurface and said top surface, granular mineral which

was previously lying in said layer at a level between said upwardly facing surface and said top surface.

5 A method as claimed in claim 1, wherein the granular mineral is dispersed in a liquid to form a slurry which flows along a pipe having walling which constrains the slurry and causes it to flow axially along the pipe, inserting a probe into said pipe so that a leading end of the probe is spaced from said walling, illuminating the dispersed granules flowing in said pipe in an illumination zone spaced inwardly from said walling, and collecting light reflected from the granules in the slurry as they move through the illumination zone.

6. A method as claimed in claim 5, and comprising the step of positioning said leading end on the longitudinal axis of said pipe so that said illumination zone is on the axis of the pipe.

7. A method as claimed in claim 1, and comprising placing a layer of granular mineral in a vertically elongate container having a transparent wall, directing a beam of light at said wall to form an illumination zone intermediate the top surface of the powdered mineral and the undersurface of the granular mineral, rotating said container about a vertical axis so that the granular mineral in the container at a level intermediate said top and undersurfaces moves through said illumination zone, and collecting light reflected off the granular mineral in said zone.

8. A method as claimed in claim 7, and including the step of directing said

beam of light obliquely at said container wall so that light which reflects off the container wall is not collected for spectral analysis.

9. Apparatus for analysing a mineral in granular form to provide information pertaining to its composition, the apparatus comprising a light source at an illumination zone for directing light onto said granular mineral at said zone, means for collecting light reflected from the granular mineral in said zone, means for spectrally analysing the reflected light, and means which constrains said granular mineral into a layer having an undersurface and a top surface, said illumination zone being at a level which is intermediate said top and undersurfaces of said layer.

10. Apparatus as claimed in claim 9 and including a probe for insertion into said layer so that a leading end of the probe is at said illumination zone.

11. Apparatus as claimed in claim 10, wherein said light source is constituted by the end of a first optical fibre, the probe including a second optical fibre for transmitting reflected light to said means for spectrally analysing the reflected light.

12. Apparatus as claimed in claim 11, and including a group of first optical fibres and a group of second optical fibres.

13. Apparatus as claimed in claim 10, 11 or 12 and further including a scraper for causing an upper part of said layer to be diverted around the probe

thereby to expose an upwardly facing granular mineral surface intermediate said undersurface and said top surface, said probe serving to illuminate, and to collect reflected light from, the intermediate granular mineral surface.

14. Apparatus as claimed in claim 9, 10, 11 or 12 and comprising a vertically elongate container for receiving mineral in granular form, said container having transparent side walling and there being means for rotating said container about a vertical axis, said light source being positioned to direct light at the container to create an illumination zone intermediate the top and bottom surfaces of a charge of granular mineral in said container.

15. Apparatus as claimed in claim 14, wherein said probe is positioned so that light is directed obliquely at said container's walling thereby to prevent light reflected off said container being transmitted to said means for spectrally analysing the reflected light.

16. An installation comprising apparatus as claimed in claim 10, 11 or 12 and a pipe along which a slurry comprising a liquid with mineral in granular form dispersed in it flows, said pipe including walling and said probe being inserted into said pipe through said walling thereof so that the leading end of the probe is within the pipe and spaced inwardly from the walling.

17. An installation as claimed in claim 16, wherein that surface of the leading end of the probe through which light passes faces upstream and slopes in

the downstream direction from its lower edge towards its upper edge.

18. An installation as claimed in claim 17, wherein said surface slopes at an angle of between 30° and 60° with respect to vertical.

19. An installation comprising apparatus as claimed in claim 13 and a conveyor on which a stream of mineral in granular form is moved, said scraper protruding into said stream of material to divert an upper layer of said stream and expose said intermediate granular material surface.